UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

In reply refer to:
151422SWR2004SA9161:HLB

MAY 16 2005

Ms. Laurie Tippen
Forest Supervisor
Lassen National Forest
2550 Riverside Drive
Susanville, California 96130

Dear Ms. Tippen:

This document transmits NOAA's National Marine Fisheries Service's (NMFS) biological opinion (Enclosure) based on our review of Lassen National Forest's (LNF) biological assessment (BA) of a proposed action to issue two special use permits authorizing outfitter guide fishing, by two outfitter guiding groups, on Deer, Mill, and Antelope Creeks, in Tehama County, California, and its effects on federally-listed threatened Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), and threatened Central Valley steelhead (*O. mykiss*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your May 20, 2004, request for formal consultation was received on May 25, 2004.

This biological opinion is based on information provided in the May 2004, BA for Outfitter Guide Special Use Permits, discussions held at meetings with representatives of LNF and NMFS, and telephone conversations between Kelly Finn and Howard Brown of NMFS, and Melanie McFarland and Ken Roby of LNF. A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

Based on the best available scientific and commercial information, the biological opinion concludes that this project is not likely to jeopardize the above species or adversely modify proposed critical habitat. NMFS has also included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize incidental take associated with the project.

The biological opinion also concludes that the action will not result in any adverse effects to anadromous fish habitat. Because of this conclusion, NMFS also believes that the project is not likely to adversely affect the Essential Fish Habitat (EFH) of Pacific salmon identified by the Magnuson-Stevens Fishery Conservation Act (MSA) as amended (U.S.C 180 *et seq.*).

If you have any questions regarding this correspondence, please contact Mr. Howard Brown in our Sacramento Area Office, 650 Capitol Mall, Suite 8-300, Sacramento, CA 95814. Mr. Brown may be reached by telephone at (916) 930-3608 or by Fax at (916) 930-3629.

Sincerely,

Anthony C. Norton

for Rodney R. McInnis
Regional Administrator

Enclosure

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY:	Lassen National Forest
ACTIVITY:	Outfitter Guide Special Use Permits
CONSULTATION CONDUCTED BY:	Southwest Region, National Marine Fisheries Service
DATE ISSUED:	MAY 16 2005
FILE NUMBER:	151422SWR2004SA9161

I. CONSULTATION HISTORY

On May 5, 2003, and in June 2003, Lassen National Forest (LNF) staff Melanie McFarland and Ken Roby discussed the proposed action with NOAA's National Marine Fisheries Service's (NMFS) biologist Kelly Finn.

In November 2003, a draft biological assessment (BA) for Outfitter Guide Special Use Permits was submitted to NMFS and discussed with NMFS biologist Howard Brown. The draft BA was revised, further discussed at an April 30, 2004, meeting between LNF and NMFS, and finalized in May 2004.

On May 20 2004, LNF requested formal section 7 consultation on the effects of the proposed action on federally-listed anadromous fish and the essential fish habitat (EFH) of Pacific salmon. Formal consultation was initiated on May 25, 2004.

This biological opinion is based on information provided in the BA, discussions held during the meetings, and telephone conversations between Kelly Finn and Howard Brown of NMFS, and Melanie McFarland and Ken Roby of LNF. A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

II. DESCRIPTION OF THE PROPOSED ACTION

A. Project Activities

The proposed action is to issue two special use permits (*i.e.*, to two separate permittees) that authorize outfitter guide fishing in anadromous fish habitat of Deer, Mill, and Antelope Creeks. An annual permit would be issued to each permittee for two years.

The action would authorize a total annual maximum of 152 angler visits on the three creeks for two years. The average angler visit is expected to last for 2 hours, for a total of 304 angler hours per year for both permits combined. Two types of angler use will occur; one is instructional, where beginning anglers are taught the basics of fly-fishing. The second, less frequent use is guiding of individuals to catch and release fish. Estimated total angler visits for each type of use are 65 instructional and 15 guiding on Deer Creek, 30 instructional and 6 guiding on Mill Creek, and 30 instructional and 6 guiding on Antelope Creek.

Each permittee would be required to document the amount of use, type and number of fish caught and released, and note observations on other angling activity for each day of use. An angler-use form will be completed by each permittee for each visit.

B. Proposed Conservation Measures

The permitted use would conform to California Department of Fish and Game (CDFG) fishing regulations, and to the terms of CDFG provisions for outfitter guide permits. Permittees will be instructed to avoid physical disturbance to redds during the spring and early summer. Use will be terminated in the fall when spring-run Chinook salmon redds are identified by LNF fishery biologists in permitted use areas.

To minimize the potential for anglers to encounter and catch adult spring-run Chinook salmon, use on Deer Creek will be restricted to stream reaches with low numbers of holding and spawning spring-run Chinook salmon that may be present throughout the fishing season. Use will be restricted to three reaches: from the State Route 32 Bridge (Red Bridge) downstream to Lower Deer Creek Falls; from the Transfer Bridge downstream to Wilson Cove; and from the confluence with Beaver Creek downstream to the boundary of the Ishi Wilderness Area. These areas were selected due to the low number of spring-run Chinook salmon that are expected to oversummer, relative to other reaches. Similar restrictions will not be applied to Mill and Antelope Creeks due to the remote location of adult spring-run Chinook salmon holding and spawning habitat, and its relative inaccessibility by anglers.

C. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area, for the purposes of this biological opinion, is located along Deer Creek from Upper Deer Creek Falls, downstream to the boundary of the Ishi Wilderness Area; along Mill Creek from the vicinity of the State Route 36 Bridge, downstream to the boundary of the Ishi Wilderness Area; and along Antelope Creek from the vicinity of Ponderosa Way, downstream to the vicinity of the Paynes Place Crossing. This area was selected because it represents the upstream and downstream extent of anticipated angler activity for each anadromous stream affected by the action. Deer, Mill, and Antelope Creeks drain southern Cascade volcanic formations and flow southwest, directly into the Sacramento River between Red Bluff, and Hamilton City, California.

III. STATUS OF THE SPECIES AND HABITAT

This biological opinion analyzes the effects of issuing two Outfitter Guide Special Use Permits on the following threatened species and their proposed and designated critical habitat:

Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) - threatened
Central Valley spring-run Chinook salmon - proposed critical habitat
Central Valley steelhead - threatened (*O. mykiss*)
Central Valley steelhead - proposed critical habitat

A. Species Life History, Population Dynamics, and Likelihood of Survival and Recovery

1. <u>Central Valley Spring-Run Chinook Salmon</u>

NMFS listed the Central Valley (CV) spring-run Chinook salmon evolutionarily significant unit (ESU) as threatened on September 16, 1999 (64 FR 50394). In June 2004 NMFS proposed that CV spring-run Chinook salmon remain listed as threatened (69 FR 33102). This proposal was based on the recognition that although CV spring-run Chinook salmon productivity trends are positive, the ESU continues to face risks from having a limited number of remaining metapopulations (*i.e.,* three existing populations from an estimated 17 historical populations), a limited geographic distribution, and potential hybridization with Feather River Hatchery spring-run Chinook salmon which are not in the ESU and display genetic similarities to fall-run Chinook salmon.

Adult spring-run Chinook salmon enter the Sacramento-San Joaquin Delta (Delta) from the Pacific Ocean beginning in January and enter natal streams from March to July. In Mill Creek, Van Woert (1964) noted that of 18,290 spring-run Chinook salmon observed from 1953 to 1963; 93.5 percent were counted between April 1 and July 14, and 89.3 percent were counted between April 29 and June 30.

During their upstream migration, adult Chinook salmon require streamflows sufficient to provide olfactory and other orientation cues used to locate their natal streams. Adequate streamflows also are necessary to allow adult passage to upstream holding habitat. The preferred temperature range for upstream migration is 38 °F to 56 °F (Bell 1991, CDFG 1998).

Upon entering fresh water, spring-run Chinook salmon are sexually immature and must hold in cold water for several months to mature. Typically, spring-run Chinook salmon utilize mid-to high-elevation streams that provide appropriate temperatures and sufficient flow, cover, and pool depth to allow over-summering. Spring-run Chinook salmon also may utilize tailwaters below dams if cold water releases provide suitable habitat conditions. Spawning occurs between September and October and, depending on water temperature, emergence occurs between November and February.

Spring-run Chinook salmon emigration is highly variable (CDFG 1998). Some may begin outmigrating soon after emergence, whereas others oversummer and emigrate as yearlings with the onset of increased fall storms (CDFG 1998). The emigration period for spring-run Chinook salmon extends from November to early May, with up to 69 percent of young-of-the-year outmigrants passing through the lower Sacramento River between mid-November and early January (Snider and Titus 2000). Outmigrants also are known to rear in non-natal tributaries to the Sacramento River, and the Delta (CDFG 1998).

Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (Myers *et al.* 1998). Fisher (1994) reported that 87 percent of Chinook trapped and examined at the Red Bluff Diversion Dam (RBDD) between 1985 and 1991 were three-year-olds.

Spring-run Chinook salmon were once the most abundant run of salmon in the Central Valley (Campbell and Moyle 1992) and were found in both the Sacramento and San Joaquin drainages. More than 500,000 spring-run Chinook salmon were caught in the Sacramento-San Joaquin commercial fishery in 1883 alone (Yoshiyama *et al.* 1998). The San Joaquin populations were essentially extirpated by the 1940s, with only small remnants of the run that persisted through the 1950s in the Merced River (Hallock and Van Woert 1959, Yoshiyama *et al.* 1998). Populations in the upper Sacramento, Feather, and Yuba Rivers were eliminated with the construction of major dams during the1950s and 1960s. Naturally spawning populations of spring-run Chinook salmon currently are restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, Feather River, and the Yuba River (CDFG 1998).

Since 1969, the spring-run Chinook salmon ESU has displayed broad fluctuations in abundance, ranging from 1,403 in 1993 to 25,890 in 1982 (CDFG 2003). The average abundance for the ESU was 12,590 for the period of 1969 to 1979, 13,334 for the period of 1980 to 1990, and 6,554 from 1991 to 2001. Evaluating the abundance of the ESU as a whole, however, complicates trend detection. For example, although the mainstem Sacramento River population appears to have undergone a significant decline, the data are not necessarily comparable because coded wire tag information gathered from fall-run Chinook salmon returns since the early 1990s has resulted in adjustments to ladder counts at RBDD. These adjustments have reduced the overall number of fish that are categorized as spring-run Chinook salmon (Colleen Harvey-Arrison, CDFG, pers. comm., 2003).

Sacramento River tributary populations in Mill, Deer, and Butte Creeks are probably the best trend indicators for the CV spring-run Chinook ESU as a whole. These streams have shown positive escapement trends since 1991. Recent escapements to Butte Creek, including 20,259 in 1998, 9,605 in 2001 and 8,785 in 2002 (CDFG 2002 and CDFG 2003), represent the greatest proportion of the ESU's abundance. Although recent trends are positive, annual abundance estimates display a high level of fluctuation, and the overall number of CV spring-run Chinook salmon remains well below estimates of historic abundance. Additionally, in 2003, high water temperatures, high fish densities, and an outbreak of Columnaris Disease (*Flexibacter columnaris*) and Ichthyophthiriasis (*Ichthyophthirius multifiliis*) contributed to the pre-spawning mortality of an estimated 11,231 adult spring-run Chinook salmon in Butte Creek. Because the CV spring-run Chinook salmon ESU is confined to relatively few remaining streams; continues to display broad fluctuations in abundance; and a large proportion of the population (*i.e.*, in Butte Creek) faces the risk of high mortality rates, the population is at a moderate to high risk of extinction.

2. Central Valley Steelhead

NMFS listed the Central Valley (CV) steelhead ESU as threatened on March 19, 1998 (63 FR 13347). The ESU includes all naturally-produced CV steelhead in the Sacramento-San Joaquin River Basin. NMFS published a final 4(d) rule for steelhead on July 10, 2000 (65 FR 42422). The 4(d) rule applies the section 9 take prohibitions to threatened species except in cases where the take is associated with State and local programs that are approved by NMFS. In June 2004 NMFS proposed that CV steelhead remain listed as threatened (69 FR 33102). This proposal is based on the recognition that although the NMFS Biological Review Team (BRT) (NMFS 2003) found the ESU "in danger of extinction," ongoing protective efforts for this ESU, and the likely implementation of an ESU-wide monitoring program effectively counter this finding. NMFS also is proposing changes involving steelhead hatchery populations (69 FR 31354). The Coleman National Fish Hatchery and Feather River Fish Hatchery steelhead populations are proposed for inclusion in the listed population of steelhead. These populations previously were included in the ESU but were not deemed essential for conservation and thus not part of the listed steelhead population. Finally, NMFS has proposed to include resident *Oncorhynchus mykiss,* present below natural or long-standing artificial barriers, in all steelhead ESU's (69 FR 33102).

All steelhead stocks in the Central Valley are winter-run steelhead (McEwan and Jackson 1996). Steelhead are similar to Pacific salmon in their life history requirements. They are born in fresh water, emigrate to the ocean, and return to freshwater to spawn. Unlike other Pacific salmon, steelhead are capable of spawning more than once before they die.

The majority of the CV steelhead spawning migration occurs from October through February and spawning occurs from December to April in streams with cool, well-oxygenated water that is available year round. Van Woert (1964) and Harvey (1995) observed that in Mill Creek, the CV steelhead migration is continuous, and although there are two peak periods, 60 percent of the run is passed by December 30. Similar bimodal run patterns have also been observed in the Feather River (Brad Cavallo, California Department of Water Resources (CDWR), pers. comm., 2002), and the American River (John Hannon, Bureau of Reclamation, pers. comm., 2002).

Incubation time is dependent upon water temperature. Eggs incubate for 1.5 to 4 months before emerging. Eggs held between 50 °F and 59 °F hatch within 3 to 4 weeks (Moyle 1976). Fry emerge from redds within in about 4 to 6 weeks depending on redd depth, gravel size, siltation, and temperature (Shapovalov and Taft 1954). Newly emerged fry move to shallow stream margins to escape high water velocities and predation (Barnhart 1986). As fry grow larger they move into riffles and pools and establish feeding locations. Juveniles rear in freshwater for 1 to 4 years (Meehan and Bjornn 1991), emigrating episodically from natal springs during fall, winter and spring high flows (Colleen Harvey Arrison, CDFG, pers. comm. 1999). Steelhead typically spend 2 years in fresh water. Adults spend 1 to 4 years at sea before returning to freshwater to spawn as 4- or 5-year-olds (Moyle 1976).

Steelhead historically were well-distributed throughout the Sacramento and San Joaquin Rivers (Busby *et al.* 1996). Steelhead were found from the upper Sacramento and Pit River systems south to the Kings and possible the Kern River systems and in both east- and west-side Sacramento River tributaries (Yoshiyama *et al.* 1996). The present distribution has been greatly reduced (McEwan and Jackson 1996). The California Advisory Committee on Salmon and Steelhead (1988) reported a reduction of steelhead habitat from 6,000 miles historically to 300 miles.

Existing wild steelhead stocks in the Central Valley mostly are confined to upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks and the Yuba River. Populations may exist in Big Chico and Butte Creeks and a few wild steelhead are produced in the American and Feather Rivers (McEwan and Jackson 1996). Until recently, CV steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be void of steelhead (McEwan 2001). Naturally spawning populations may exist in many other streams but are undetected due to lack of monitoring programs (Interagency Ecological Program Steelhead Project Work Team (SPWT) 1999).

Reliable estimates of CV steelhead abundance for different basins are not available (McEwan 2001). However, CV steelhead population trends show a steady decline since the 1950s. The California Fish and Wildlife Plan (CDFG 1965) estimated there were 40,000 steelhead in the early 1950s. Hallock et al. (1961) estimated an average of 20,540 adult steelhead through the 1960s in the Sacramento River, upstream of the Feather River. McEwan and Jackson (1996) estimated the total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults. Steelhead counts at the RBDD have declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the 1990s (McEwan and Jackson 1996, McEwan 2001). In the *Updated Status Review of West Coast Salmon and Steelhead* (NMFS 2003), the BRT estimated that only 3,628 female steelhead spawn naturally in the entire Central Valley.

The majority of Central Valley steelhead are restricted to non-historical spawning and rearing habitat below dams. Smaller populations of steelhead are known to occur outside the action area (*i.e.*, Yuba River, Deer Creek, Mill Creek, Antelope Creek), but the abundance of these fragmented populations is unknown. Existing spawning and rearing habitat has only enough carrying capacity to sustain steelhead at a population level that would be considered endangered. Chipps Island Trawl data and Delta Fish Facility salvage and loss data suggest that the natural population is continuing to decline and that hatchery steelhead dominate the catch entering the Bay-Delta region (NOAA Fisheries 2003; 69 FR 33102). The future of CV steelhead is uncertain because of the lack of status and trend data.

B. Habitat Condition and Function for Species' Conservation

The freshwater habitat of salmon and steelhead in the Central Valley varies in function depending on location. Spawning areas are located in accessible, upstream reaches of the Sacramento or San Joaquin Rivers and their watersheds where viable spawning gravels and water conditions are found. Spawning habitat condition is strongly affected by water flow and quality, especially temperature, dissolved oxygen, and silt load, all of which can greatly affect the survival of eggs and larvae.

Migratory corridors are downstream of the spawning area and include the Sacramento-San Joaquin Delta. These corridors allow the upstream passage of adults, and the downstream emigration of outmigrant juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams, unscreened or poorly- screened diversions, and degraded water quality.

Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and presence of predators of juvenile salmonids. Some complex, productive habitats with floodplains remain in the system (*e.g.*, the lower Cosumnes River, Sacramento River reaches with setback levees [*i.e.*, primarily located upstream of the City of Colusa]). However, the channelized, leveed, and rip-rapped river reaches and sloughs that are common in the Sacramento-San Joaquin system typically have low habitat complexity, low abundance of food organisms, and offer little protection from either fish or avian predators.

C. Factors Affecting the Species and Habitat

A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of salmon and steelhead species in the Central Valley. For example, NMFS prepared range-wide status reviews for west coast Chinook salmon (Myers *et al.* 1998) and steelhead (Busby *et al.* 1996). Also, the NMFS BRT published a draft updated status review for west coast Chinook salmon and steelhead in November 2003 (NMFS

2003). Information also is available in Federal Register notices announcing ESA listing proposals and determinations for some of these species and their critical habitat (*e.g.*, 58 FR 33212; 59 FR 440; 62 FR 24588; 62 FR 43937; 63 FR 13347; 64 FR 24049; 64 FR 50394; 65 FR 7764). The Final Programmatic Environmental Impact Statement/Report (EIS/EIR) for the California Bay Delta Authority (CALFED), the Final Programmatic EIS for the Central Valley Project Improvement Act (CVPIA) provide a summary of historical and recent environmental conditions for salmon and steelhead in the Central Valley. The following general description of the environmental baseline for CV spring-run Chinook salmon and CV steelhead is based on a summarization of these documents.

In general, the human activities that have affected the listed anadromous salmonids and their habitats addressed in this opinion consist of: (1) dam construction that blocks previously accessible habitat; (2) water development and management activities that affect water quantity, flow timing, and quality; (3) land use activities such as agriculture, flood control, urban development, mining, road construction, and logging that degrade aquatic and riparian habitat; 4) hatchery operation and practices; (5) harvest activities; and (6) ecosystem restoration actions.

1. <u>Habitat Blockage</u>

Hydro power, flood control, and water supply dams of the Central Valley Project (CVP), the State Water Project (SWP), and other municipal and private entities have permanently blocked or hindered salmonid access to historical spawning and rearing grounds. Clark (1929) estimated that originally there were 6,000 miles of salmon habitat in the Central Valley system and that 80 percent of this habitat had been lost by 1928. Yoshiyama *et al.* (1996) calculated that roughly 2,000 miles of salmon habitat was actually available before dam construction and mining, and concluded that 82 percent is not accessible today.

In general, large dams on every major tributary to the Sacramento River, San Joaquin River, and Sacramento-San Joaquin Delta block salmon and steelhead access to the upper portions of the respective watersheds. On the Sacramento River, Keswick Dam blocks passage to historic spawning and rearing habitat in the upper Sacramento, McCloud, and Pit rivers. Whiskeytown Dam blocks access to the upper watershed of Clear Creek. Oroville Dam and associated facilities block passage to the upper Feather River watershed. Nimbus Dam blocks access to most of the American River basin. Friant Dam construction in the mid-1940s has been associated with the elimination of spring-run Chinook salmon in the San Joaquin River upstream of the Merced River. On the Stanislaus River, construction of New Melones and Goodwin Dams blocked both spring-and fall-run Chinook salmon (CDFG 2001).

As a result of the dams, spring-run Chinook salmon and steelhead populations on these rivers have been confined to lower elevation mainstem reaches that historically only were used for migration. Population abundances have declined in these streams due to decreased quantity and quality of spawning and rearing habitat. Higher temperatures at these lower elevations during late summer and fall are a major stressor to adults and juvenile salmonids.

The Suisun Marsh Salinity Control Gates (SMSCG), located on Montezuma Slough, were installed in 1988, and are operated with gates and flashboards to decrease the salinity levels of managed wetlands in Suisun Marsh. The SMSCG have delayed or blocked passage of adult Chinook salmon migrating upstream (Edwards *et al.* 1996, Tillman *et al.* 1996, CDWR 2002).

2. Water Development

The diversion and storage of natural flows by dams and diversion structures on Central Valley waterways have depleted stream flows and altered the natural cycles by which juvenile and adult salmonids base their migrations. Depleted flows have contributed to higher temperatures, lower dissolved oxygen levels, and decreased recruitment of gravel and large woody debris. Furthermore, more uniform flows year round have resulted in diminished natural channel formation, altered foodweb processes, and slower regeneration of riparian vegetation. These stable flow patterns have reduced bedload movement (Ayers 2001) and caused spawning gravels to become embedded, and reduced channel width, which has decreased the available spawning and rearing habitat below dams.

Water diversions for irrigated agriculture, municipal and industrial use, and managed wetlands are found throughout the Central Valley. Hundreds of small and medium-size water diversions exist along the Sacramento River, San Joaquin River, and their tributaries. Although efforts have been made in recent years to screen some of these diversions, many remain unscreened. Depending on the size, location, and season of operation, these unscreened intakes entrain and kill many life stages of aquatic species, including juvenile salmonids. For example, as of 1997, 98.5 percent of the 3,356 diversions included in a Central Valley database were either unscreened or screened insufficiently to prevent fish entrainment (Herren and Kawasaki 2001). Most of the 370 water diversions operating in Suisun Marsh are unscreened (FWS 2003).

Outmigrant juvenile salmonids in the Delta have been subjected to adverse environmental conditions created by water export operations at the CVP/SWP. Specifically, juvenile salmonid survival has been reduced from: (1) water diversion from the mainstem Sacramento River into the Central Delta via the Delta Cross Channel; (2) upstream or reverse flows of water in the lower San Joaquin River and southern Delta waterways; (3) entrainment at the CVP/SWP export facilities and associated problems at Clifton Court Forebay; and (4) increased exposure to introduced, non-native predators such as striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), and American shad (*Alosa sapidissima*).

3. Land Use Activities

Land use activities continue to have large impacts on salmonid habitat in the Central Valley. Until about 150 years ago, the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation extending outward for 4 or 5 miles (California Resources Agency 1989). By 1979, riparian habitat along the Sacramento River had diminished to 11,000 to 12,000 acres, or about 2 percent of historic levels (McGill 1987). The degradation and fragmentation of riparian habitat had resulted mainly from flood control and bank protection projects, together with the conversion of riparian land to agriculture (Jones and Stokes Associates 1993).

Increased sedimentation resulting from agricultural and urban practices within the Central Valley is a primary cause of salmonid habitat degradation (NMFS 1996). Sedimentation can adversely affect salmonids during all freshwater life stages by; clogging, or abrading gill surfaces, adhering to eggs, hamper fry emergence (Phillips and Campbell 1961); burying eggs or alevins; scouring and filling in pools and riffles; reducing primary productivity and photosynthesis activity (Cordone and Kelley 1961); and affecting intergravel permeability and dissolved oxygen levels. Excessive sedimentation over time can cause substrates to become embedded, which reduces successful salmonid spawning, and egg and fry survival (Hartmann *et al.* 1987).

Land use activities associated with road construction, urban development, logging, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality through alteration of streambank and channel morphology; alteration of ambient water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of large woody debris (LWD); and removal of riparian vegetation resulting in increased streambank erosion (Meehan and Bjornn 1991). Agricultural practices in the Central Valley have eliminated large trees and logs and other woody debris that would otherwise be recruited into the stream channel (NMFS 1998). LWD influences stream morphology by affecting channel pattern, position, and geometry, as well as pool formation (Keller and Swanson 1979, Bilby 1984, Robison and Beschta 1990).

Since the 1850s, wetlands reclamation for urban and agricultural development has caused the cumulative loss of 79 and 94 percent of the tidal marsh habitat in the Sacramento-San Joaquin Delta downstream and upstream of Chipps Island, respectively (Monroe *et al.* 1992, Goals Project 1999). In Suisun Marsh, salt water intrusion and land subsidence gradually has led to the decline of agricultural production. Presently, Suisun Marsh consists largely of tidal sloughs and managed wetlands for duck clubs.

Juvenile salmonids are exposed to increased water temperatures in the Delta during the late spring and summer due to the loss of riparian shading, and by thermal inputs from municipal, industrial, and agricultural discharges. Studies by CDWR on water quality in the Delta over the last 30 years show a steady decline in the food sources available for juvenile salmonids and an increase in the clarity of the water (Z. Hymanson, pers. comm., IEP Workshop 2002). These conditions have contributed to increased mortality of juvenile Chinook salmon and steelhead as they move through the Delta.

4. Hatchery Operations and Practices

Five hatcheries currently produce Chinook salmon in the Central Valley and four of these also produce steelhead. Releasing large numbers of hatchery fish can pose a threat to wild Chinook salmon and steelhead stocks through genetic impacts, competition for food and other resources between hatchery and wild fish, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs in the Central Valley primarily are caused by straying of hatchery fish and the subsequent interbreeding of hatchery fish with wild fish. In the Central Valley, practices such as transferring eggs between hatcheries and trucking smolts to distant sites for release contribute to elevated straying levels.

Hatchery practices as well as spatial and temporal overlaps of habitat use and spawning activity between spring- and fall-run fish have led to the hybridization and homogenization of some subpopulations (CDFG 1998). As early as the 1960s, Slater (1963) observed that early fall- and spring-run Chinook salmon were competing for spawning sites in the Sacramento River below Keswick Dam, and speculated that the two runs may have hybridized. Feather River Hatchery (FRH) spring-run Chinook salmon have been documented as straying throughout the Central Valley for many years (CDFG 1998), and in many cases have been recovered from the spawning grounds of fall-run Chinook salmon (Colleen Harvey-Arrison and Paul Ward, CDFG, pers. comm., 2002), an indication that FRH spring-run Chinook salmon may exhibit fall-run life history characteristics. Although the degree of hybridization has not been comprehensively determined, it is clear that the populations of spring-run Chinook salmon spawning in the Feather River and counted at RBDD contain hybridized fish.

The management of hatcheries, such as Nimbus Hatchery and FRH, can directly impact spring-run Chinook salmon and steelhead populations by overproducing the natural capacity of the limited habitat available below dams. In the case of the Feather River, significant redd superimposition occurs in-river due to hatchery overproduction and the inability to physically separate spring-run and fall-run Chinook salmon adults. This concurrent spawning has led to hybridization between the spring- and fall-run Chinook salmon in the Feather River. At Nimbus Hatchery, operating Folsom Dam to meet temperature requirements for returning hatchery fall-run Chinook salmon often limits the amount if water available for steelhead spawning and rearing the rest of the year.

The increase in Central Valley hatchery production has reversed the composition of the steelhead population, from 88 percent naturally-produced fish in the 1950s (McEwan 2001) to an estimated 23 to 37 percent naturally-produced fish currently (Nobriga and Cadrett 2001). The increase in hatchery steelhead production proportionate to the wild population has reduced the viability of the wild steelhead populations, increased the use of out-of-basin stocks for hatchery production, and increased straying (NMFS 2001). Thus, the ability of natural populations to successfully reproduce has likely been diminished.

The relatively low number of spawners needed to sustain a hatchery population can result in high harvest-to-escapements ratios in waters where regulations are set according to hatchery population. This can lead to over-exploitation and reduction in size of wild populations coexisting in the same system (McEwan 2001).

Hatcheries also can have some positive effects on salmonid populations. Artificial propagation has been shown effective in bolstering the numbers of naturally spawning fish in the short term under certain conditions, and in conserving genetic resources and guarding against catastrophic loss of naturally spawned populations at critically low abundance levels, such as Sacramento River winter-run Chinook salmon. However, relative abundance is only one component of a viable salmonid population.

5. Ocean and Sport Harvest

Extensive ocean recreational and commercial troll fisheries for Chinook salmon exist along the Central California coast, and an inland recreational fishery exists in the Central Valley for Chinook salmon and steelhead. Ocean harvest of Central Valley Chinook salmon is estimated using an abundance index, called the Central Valley Index (CVI). The CVI is the ratio of Chinook salmon harvested south of Point Arena (where 85 percent of Central Valley Chinook salmon are caught) to escapement. Coded wire tag returns indicate that Sacramento River salmon congregate off the coast between Point Arena and Morro Bay.

Ocean fisheries have affected the age structure of spring-run Chinook salmon through targeting large fish for many years and reducing the number of four- and five-year-olds (CDFG 1998). There are limited data on spring-run Chinook salmon ocean harvest rates. An analysis of six tagged groups of FRH spring-run Chinook salmon by Cramer and Demko (1997) indicates that harvest rates of 3-year-olds ranged from 18 percent to 22 percent, 4-year-olds ranged from 57 percent to 84 percent, and 5-year-olds ranged from 97 percent to 100 percent. The almost complete removal of 5-year-olds from the population effectively reduces the age structure of the species, which reduces its resiliency to factors that may impact a year class (*e.g.*, pre-spawning mortality from lethal instream water temperatures).

In-river recreational fisheries historically have taken spring-run Chinook salmon throughout the species' range. During the summer, holding adult spring-run Chinook salmon are easily targeted by anglers when they congregate in large pools. Poaching also occurs at fish ladders, and other areas where adults congregate; however, the significance of poaching on the adult population is unknown. Specific regulations for the protection of spring-run Chinook salmon in Mill, Deer, Butte and Big Chico creeks were added to the existing CDFG regulations in 1994. The current regulations, including those developed for winter-run Chinook salmon, provide some level of protection for spring-run fish (CDFG 1998).

There is little information on steelhead harvest rates in California. Hallock *et al.* (1961) estimated that harvest rates for Sacramento River steelhead from the 1953-54 through 1958-59 seasons ranged from 25.1 percent to 45.6 percent assuming a 20 percent non-return rate of tags. Staley (1975) estimated the harvest rate in the American River during the 1971-72 and 1973-74 seasons to be 27 percent. The average annual harvest rate of adult steelhead above Red Bluff Diversion Dam for the three year period from 1991-92 through 1993-94 was 16 percent (McEwan and Jackson 1996). Since 1998, all hatchery steelhead have been marked with an adipose fin clip allowing anglers to distinguish hatchery and wild steelhead. Current regulations restrict anglers from keeping unmarked steelhead in Central Valley streams (CDFG 2004). Overall, this regulation has greatly increased protection of naturally produced adult steelhead.

6. Predation

Accelerated predation may also be a factor in the decline of spring-run Chinook salmon, and to a lesser degree steelhead. Additionally, human-induced habitat changes such alteration of natural flow regimes and installation of bank revetment and structures such as dams, bridges, water diversions, piers, and wharves often provide conditions that both disorient juvenile salmonids and attract predators (Stevens 1961, Vogel *et al.* 1988, Garcia 1989, Decato 1978).

At RBDD, juveniles are subject to conditions which greatly disorient them, making them highly susceptible to predation by fish or birds. Sacramento pikeminnow (*Ptychocheilus grandis*) and striped bass (*Morone saxatilis*) congregate below the dam and prey on juvenile salmon.

On the mainstem Sacramento River, high rates of predation are known to occur where rock revetment has replaced natural river bank vegetation, and at south Delta water diversion structures (*e.g.*, Clifton Court Forebay, CDFG 1998). FWS found that more predatory fish were found at rock revetment bank protection sites between Chico Landing and Red Bluff than at sites with naturally eroding banks (Michny and Hampton 1984). From October 1976 to November 1993, CDFG conducted 10 mark/recapture experiments at the SWP's Clifton Court Forebay to estimate pre-screen losses using hatchery-reared juvenile Chinook salmon. Pre-screen losses ranged from 69 percent to 99 percent. Predation from striped bass is thought to be the primary cause of the loss (Gingras 1997).

Other locations in the Central Valley where predation is of concern include flood bypasses, release sites for salmonids salvaged at the State and Federal fish facilities, and the Suisun Marsh Salinity Control Structure. Predation on salmon by striped bass and pikeminnow at salvage release sites in the Delta and lower Sacramento River has been documented (Orsi 1967, Pickard *et al.* 1982). Predation rates at these sites are difficult to determine. CDFG conducted predation studies from 1987-1993 at the Suisun Marsh Salinity Control Structure to determine if the structure attracts and concentrates predators. The dominant predator species at the structure was striped bass, and juvenile Chinook salmon were identified in their stomach contents (NMFS 1997).

7. Ecosystem Restoration

a. *California Bay-Delta Authority*

Two CALFED programs, the Ecosystem Restoration Program (ERP) and the Environmental Water Account (EWA), were created to improve conditions for fish, including listed salmonids, in the Central Valley. Restoration actions implemented by the ERP include the installation of fish screens, modification of barriers to improve fish passage, habitat acquisition, and instream habitat restoration. The majority of these recent actions address key factors affecting listed salmonids, and emphasis has been placed in tributary drainages with high potential for steelhead and spring-run Chinook salmon production. Additional ongoing actions include new efforts to enhance fisheries monitoring and directly support salmonid production through hatchery releases. Recent habitat restoration initiatives sponsored and funded primarily by the CALFED-ERP Program have resulted in plans to restore ecological function to 9,543 acres of shallow-water tidal and marsh habitats within the Delta. Restoration of these areas primarily involves flooding lands previously used for agriculture, thereby creating additional rearing habitat for juvenile salmonids. Similar habitat restoration is imminent adjacent to Suisun Marsh (*i.e.*, at the confluence of Montezuma Slough and the Sacramento River) as part of the Montezuma Wetlands project, which is intended to provide for commercial disposal of material dredged from San Francisco Bay in conjunction with tidal wetland restoration.

A sub-program of the ERP called the Environmental Water Program (EWP) has been established to support ERP projects through enhancement of instream flows that are biologically and ecologically significant. This program is in the development stage and the benefits to listed salmonids are not yet clear. Clear Creek is one of five watersheds in the Central Valley that has been targeted for action during Phase I of this program.

The EWA is geared to providing water at critical times to meet ESA requirements and incidental take limits without water supply impacts to other users. In early 2001, EWA released 290,000 acre-feet of water at key times to offset reductions in south Delta pumping to protect Chinook salmon, delta smelt, and splittail. The actual number of fish saved was very small. The anticipated benefits to fisheries from EWA were much higher than what has actually occurred.

b. *Central Valley Project Improvement Act*

The CVPIA, implemented in 1992, requires that fish and wildlife get equal consideration with water allocations from the CVP. From this act arose two programs that have benefitted listed salmonids: the Anadromous Fish Restoration Program (AFRP) and the Water Acquisition Program (WAP). The AFRP has engaged in monitoring, education, and restoration projects geared toward recovery of all anadromous fish species residing in the Central Valley. Restoration projects funded through the AFRP include fish passage, fish screening, riparian easement and land acquisition, development of watershed planning groups, instream and riparian habitat improvement, and gravel replenishment. The goal of the WAP is to acquire water supplies to meet the habitat restoration and enhancement goals of the CVPIA and to improve the Department of the Interior's ability to meet regulatory water quality requirements. Water has been used successfully to improve fish habitat for spring-run Chinook salmon and steelhead by maintaining or increasing instream flows in Butte and Mill Creeks and the San Joaquin River at critical times.

c. *Iron Mountain Mine Remediation*

EPA's Iron Mountain Mine remediation involves the removal of toxic metals in acidic mine drainage from the Spring Creek Watershed with a state-of-the-art lime neutralization plant. Contaminant loading into the Sacramento River from Iron Mountain Mine has shown measurable reductions since the early 1990s. Decreasing the heavy metal contaminants that enter the Sacramento River should increase the survival of salmonid eggs and juveniles. However, during periods of heavy rainfall upstream of the Iron Mountain Mine, Reclamation substantially increases Sacramento River flows in order to dilute heavy metal contaminants being spilled from Spring Creek debris dam. This rapid change in flows can cause juvenile salmonids to become stranded or isolated in side channels below Keswick Dam.

d. *SWP Delta Pumping Plant Fish Protection Agreement (Four-Pumps Agreement)*

The SWP Delta Pumping Plant Fish Protection Agreement (Four-Pumps Agreement) has approved about $49 million for projects that benefit salmon and steelhead production in the Sacramento-San Joaquin basins and Delta since the agreement inception in 1986. Four Pumps projects that benefit spring-run Chinook salmon and steelhead include water exchange programs on Mill and Deer Creeks; enhanced law enforcement efforts from San Francisco Bay upstream to the Sacramento and San Joaquin Rivers and their tributaries; design and construction of fish screens and ladders on Butte Creek; and screening of diversions in Suisun Marsh and San Joaquin tributaries. Predator habitat isolation and removal, and spawning habitat enhancement projects on the San Joaquin tributaries benefit steelhead.

The Spring-run Salmon Increased Protection project provides overtime wages for CDFG wardens to focus on reducing illegal take and illegal water diversions on upper Sacramento River tributaries and adult holding areas, where the fish are vulnerable to poaching. This project covers Mill, Deer, Antelope, Butte, Big Chico, Cottonwood, and Battle Creeks, and has been in effect since 1996. Through the Delta-Bay Enhanced Enforcement Program, initiated in 1994, a team of ten wardens focus their enforcement efforts on salmon, steelhead, and other species of concern from the San Francisco Bay Estuary upstream into the Sacramento and San Joaquin River basins. These two enhanced enforcement programs, in combination with additional concern and attention from local landowners and watershed groups on the Sacramento River tributaries which support spring-run Chinook salmon summer holding habitat, have been shown to reduce the amount of poaching in these upstream areas.

The provisions of funds to cover over-budget costs for the Durham Mutual/Parrot Phelan Screen and Ladders project expedited completion of the construction phase of this project which was completed during 1996. The project continues to benefit salmon and steelhead by facilitating upstream passage of adult spawners and downstream passage of juveniles.

The Mill and Deer Creek Water Exchange projects are designed to provide new wells that enable diverters to bank groundwater in place of stream flow, thus leaving water in the stream during critical migration periods. On Mill Creek several agreements between Los Molinos Mutual Water Company (LMMWC), Orange Cove Irrigation District (OCID), CDFG, and CDWR allows CDWR to pump groundwater from two wells into the LMMWC canals to pay back LMMWC water rights for surface water released downstream for fish. Although the Mill Creek Water Exchange project was initiated in 1990 and the agreement for a well capacity of 25 cfs, only 12 cfs has been developed to date (Reclamation and OCID 1999). In addition, it has been determined that a base flow of greater than 25 cfs is needed during the April through June period for upstream passage of adult spring-run Chinook salmon in Mill Creek (Reclamation and OCID 1999). In some years, water diversions from the creek are curtailed by amounts sufficient to provide for passage of upstream migrating adult spring-run Chinook salmon and downstream migrating juvenile steelhead and spring-run Chinook salmon. However, the current arrangement does not ensure adequate flow conditions will be maintained in all years. CDWR, CDFG, and FWS have developed the Mill Creek Adaptive Management Enhancement Plan to address the instream flow issues. A pilot project using one of the 10 pumps originally proposed for Deer Creek was tested in summer 2003. Future testing is planned with implementation to follow.

IV. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline "includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area (*i.e.*, Deer Creek from the Red Bridge downstream to the boundary of the Ishi Wilderness Area; Mill Creek, from the vicinity of the State Route 32 Bridge, downstream to the boundary of the Ishi Wilderness Area; and Antelope Creek from the vicinity of Ponderosa Way, downstream to the vicinity of the Paynes Place Crossing), the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR § 402.02).

A. Status of the Species and their Habitat in the Action Area

The action area contains portions of two of the three primary populations of naturally-produced CV spring-run Chinook salmon (*i.e.,* Deer and Mill Creek populations; the third population is in Butte Creek). The action area also contains populations of CV steelhead, and provides migration, holding, spawning, and rearing habitat for both species. The total number of miles of anadromous fish habitat present within the boundary of LNF is estimated at 25 miles for Deer Creek, 43 miles for Mill Creek and 7 miles for Antelope Creek. Following is a status summary of these species and their habitat within the action area.

1. Central Valley Spring-run Chinook Salmon

Spring-run Chinook salmon utilize aquatic habitat within Deer, Mill, and Antelope Creeks, for migration, holding, spawning, and rearing. All three streams are young drainages, with few perennial tributaries to their main channels and without a well-developed, dendritic tributary drainage pattern. Tributaries to Deer, Mill, and Antelope Creeks are not used by spring-run Chinook salmon. Streamflows are mostly supplied by snowmelt, with sustaining base flows from springs and groundwater seepage. The upper and middle reaches of Deer, Mill and Antelope Creeks have cold water flowing through deeply incised canyons and moderate gradient reaches. Streambeds are dominated by riffles, interspersed with deep pools scoured into volcanic bedrock.

In Deer Creek, the present range for adult holding, spawning and early rearing extends from the vicinity of Dillon Cove, and extends upstream to Upper Deer Creek Falls. The range in elevation is approximately 1,000 feet to 3,600 feet. Deep pools with overhead bubble curtains, surface turbulence, or diverse bedrock and boulder components provide summer holding habitat for adult spring-run Chinook salmon. Holding pools throughout the action area average approximately 8 feet deep, but may be as deep as 15 feet. Riparian vegetation provides overhead cover and shade throughout the action area. Average August shade measurements range from approximately 30 to 57 percent. Although riparian vegetation is prevalent along Deer Creek, LWD does not appear to significantly contribute to the primary elements of holding habitat (LNF 1999). Spawning habitat typically is located in the alluvial deposits of large holding pools, but also is sporadically located within riffles, runs, and other areas with suitable flow, and gravel sizes. Post emergent fry utilize channel margins and backwater pools for early rearing, and yearlings are seen utilizing a variety of habitats throughout the action area including riffles, runs, pools, and backwater eddies.

The present range of adult holding, spawning and early rearing in Mill Creek extends from the vicinity of Boat Gunwale Creek, upstream to the boundary of the Lassen Volcanic National Park. The range in elevation is approximately 800 feet to 5,300 feet. Holding pools throughout the action area average less than 8 feet deep, but may be as deep as 15 feet. Average August shade ranges from approximately 20 percent to 55 percent. Similar to Deer Creek, large woody debris does not appear to contribute to the primary elements of holding habitat (LNF 1999). Spawning habitat typically is located in the alluvial deposits of large holding pools, but also is sporadically located within riffles, runs, and other areas with suitable flow, and gravel sizes. Spawning and rearing habitats are similar to Deer Creek.

Habitat surveys and water temperature data have identified limited, but adequate adult holding and spawning habitat for adult spring-run Chinook salmon in Antelope Creek (CDFG 1998). Chinook salmon holding, spawning, and early rearing in Antelope Creek occur in three reaches. The first reach is in the main channel of Antelope Creek, and extends from the vicinity of Fachts Place, upstream to the confluence with the North and South Forks. Holding, spawning, and early rearing also occur in the South Fork from the confluence with the North Fork upstream approximately 3 miles to Bear Camp, and in the North Fork upstream approximately 4 miles to a series of steep cascades near the confluence with Judd Creek. The range in elevation is from approximately 800 feet to 1,800 feet. Holding pools have been measured in the mainstem and South Fork of Antelope Creek. The average pool depth in the mainstem of Antelope Creek is less than 8 feet, with some pools up to 10 feet deep. On the South Fork, the average pool depth is near 6 feet, with some pools up to 10 feet deep. Although holding pools have not been measured in the North Fork of Antelope Creek, snorkel observations by LNF fishery biologists have noted that pools are similar to the South Fork. August shade for all reaches averages approximately 40 percent, and similar to Deer and Mill Creeks, LWD does not appear to contribute to the primary elements of holding habitat (LNF 1999). Spawning and rearing habitats are similar to Deer Creek and Mill Creeks.

Average daily summer water temperatures in all streams typically are near 60 °F. Daily maximums may range between 64 °F and 70 °F, depending on water year type and elevation. The warmest water conditions are expected in July and August at low elevation reaches (*i.e.*, less than 2,000 feet). Most reaches drop to below 56 °F by mid-September and remain below that level until mid-spring (LNF 1999). Water temperatures are slightly higher in the mainstem of Antelope Creek, where daily average summer water temperatures may exceed 65 °F, and daily maximums greater than 72 °F have been observed (LNF 1999).

The adult migration of spring-run Chinook salmon into Deer, Mill, and Antelope Creeks may extend from February to September, but generally peaks between early April and late June (CDFG 1998). Adult spring-run Chinook salmon hold in deep pools through the summer and spawn in depositional pool tails and isolated gravel deposits from mid-September through October (CDFG 1998). Spawning may begin earlier at higher elevations, and occur progressively later at lower elevations (CDFG 1998). Because of the high elevation and cold fall and winter water temperatures in Mill and Deer Creeks, eggs may incubate for up to 6 months, and juveniles emerge from January through March. Emigration timing is highly variable. The majority of juveniles remain to rear in the action area during the summer months and emigrate the following fall as yearlings. Emigration occurs from October through early March, with peak movement during November and December (CDFG 1998).

The number of naturally-spawning spring-run Chinook salmon in Deer, Mill, and Antelope Creeks has been estimated since the 1940s. The population estimates for these streams have been made using various techniques, and estimates are not available for all years. Therefore, estimates should be considered as abundance indices when comparing years. Although estimates have been made since the 1940s, the estimates provided in this biological opinion are based on CDFG' Grandtab Chinook salmon database (CDFG 2004), which only provides population estimates since 1960.

In Deer Creek, adult population estimates range from a low of 84 fish in 1989 to a high of 8,500 in 1975, and have averaged 1,393 since 1960. The average population estimate over the past 10 years is 1,303 fish, compared to 327 for the previous 10 years. In Mill Creek estimates range from a low of 61 fish in 1993 to 2,368 in 1960, and average 882. The average population estimate over the past 10 years is 715 fish, compared to 329 for the previous 10 years. In Antelope Creek estimates range from a low of 0 fish in 1992 to 154 in 1998, and average 36 (CDFG 2004). The average population estimate over the past 10 years is 41 fish, compared to 2 fish for the previous 10 years. These estimates indicate that spring-run Chinook salmon have been recovering over the past 10 years from record low numbers in the late 1980s and early 1990s, but are still below historic highs.

Several studies have evaluated the population genetics of spring-run Chinook salmon in Deer and Mill Creeks, and concluded that fish in these streams currently are independent from other spring-run populations in the Central Valley. Banks *et al.* (2000), used microsatellite loci to examine the distribution of genetic variation within and among 41 populations of Central Valley Chinook salmon, and found that Mill and Deer Creek spring-run Chinook salmon comprised 1 of 4 principle groupings. Winter-run Chinook salmon, Butte Creek spring-run Chinook salmon, and fall- and late fall-run Chinook salmon comprised the other groupings. Neighbor joining trees presented by Lindley *et al.* (2004) also show the Deer and Mill Creek populations represent a distinct grouping. Due to similarities in location, population size and habitat types, Lindley *et al.* (2004) questioned whether Deer and Mill Creek spring-run Chinook salmon represent a single population and found that a comparison of population growth rates suggests that fish in these streams have independent dynamics, although not overwhelmingly so. Thus, spring-run Chinook populations in Mill and Deer Creek are each considered to be independent populations. Genetic evaluations of spring-run Chinook salmon in Antelope Creek have not been made due to the low number of salmon that utilize this stream, and the difficulty in acquiring acceptable tissue samples from the population. Lindley *et al.* (2004) concluded that the Antelope Creek population is probably dependant upon other populations in the Central Valley, and would not have persisted without immigration from other streams.

2. Central Valley Steelhead

Steelhead utilize aquatic habitat within Deer, Mill, and Antelope Creeks, for migration, spawning, and rearing. Since little is known about the specific habitat conditions of steelhead in these streams, the habitat information presented for spring-run Chinook salmon applies for describing the status of CV steelhead habitat in the action area

Limited information exists regarding the abundance, location, and timing of steelhead migration, spawning, and rearing within the action area. Complete steelhead counts in Deer Creek are available from 1963, when 1,006 fish passed the Stanford-Vina Dam (Harvey 1995). Partial counts are available for 1942, 1943, 1993, 1994, and 2001. Adult steelhead counts for the spring of 1942 and 1943 were 145 and 109 steelhead, respectively (Needham *et al.* 1943). An electronic fish counter and visual ladder observations did not count any steelhead passing through the Stanford-Vina fish ladder from October 1993 to June 1994 (Harvey 1995). Another partial survey by Moore (2001) used snorkel and foot surveys from April through May to count adult steelhead and steelhead redds in Deer Creek. These surveys observed 37 steelhead and 35 redds in about 12 percent of the accessible anadromous habitat in Deer Creek. The observations do not represent a population estimate because the entire amount of habitat was not surveyed, and surveys may have missed the peak spawning period.

Steelhead counts in Mill Creek are available from 1953 to 1963, 1980, 1993, and 1994, for adult fish that passed Clough Dam. From 1953 to 1963, between 417 and 2,269 steelhead, with an annual average of 911 steelhead were counted at Clough Dam (Van Woert 1964). In 1980, 280 steelhead were counted, and in the 1993 to 1994 migration season, 34 steelhead were estimated. Moore (2001) used snorkel and foot surveys in January, March, and April to count adult steelhead and steelhead redds in Mill Creek. These surveys observed 15 adult steelhead and 31 redds in about 3 to 4 percent of the accessible anadromous habitat in Mill Creek. The observations do not represent a population estimate because the entire amount of habitat was not surveyed, and surveys may have missed the peak spawning period.

Steelhead counts in Antelope Creek are even more limited. Moore (2001) used snorkel and foot surveys from March through May to count adult steelhead and steelhead redds in Antelope Creek. These surveys observed a total of 47 steelhead and 52 redds in about 53 percent of the accessible anadromous habitat in Antelope Creek. These numbers do not represent a population estimate because the entire amount of habitat was not surveyed, and surveys may have missed the peak spawning period.

Based on the ladder counts at Clough Dam, on Mill Creek, between 1953 and 1963, steelhead adults migrate upstream from September through June (Van Woert 1964). Harvey (1995) observed two distinct migration peaks in Van Woert's (1964) data. The largest peak occurred from late-October to mid-November, and accounted for 30 percent of the run. A smaller peak occurred in the first 2 weeks of February, and accounted for 11 percent of the run. Because Deer and Antelope Creeks are in the same geographic region as Mill Creek, and runoff patterns are similar, steelhead migration timing also is likely to be similar.

Chinook salmon emigration studies on Deer and Mill Creeks have incidentally captured emigrating steelhead in rotary screw traps. Steelhead generally are captured from November through June, with most fish captured from December through March.

B. Factors Affecting the Species and their Habitat in the Action Area

The factors affecting the species and habitat within the action area include streamflow, water temperature, riparian habitat conditions, aquatic habitat conditions, and recreational angling. With the exception of recreational angling, these factors are influenced by annual precipitation, floods, drought, fire, and forest and rangeland management. All life stage of spring-run Chinook salmon and steelhead in the action area are affected by these factors.

Streamflow affects adult migration by either facilitating or, in low flow conditions, prohibiting passage through difficult passage areas. Flows that allow upstream passage through difficult passage areas are required for fish to access upstream holding and spawning areas. Although critical fish passage restrictions within the action area have not specifically been identified, optimal flow conditions are most likely to occur during winter, spring, and early summer months. Based on rotary screw trap captures, high stream flows also are thought to trigger juvenile outmigration within the action area.

Water temperatures also influence migration, holding, spawning, and incubation. Water temperatures throughout the action area generally are within the preferred range for all freshwater life history stages for each species. Summer water temperatures appear to influence the range of adult spring-run Chinook salmon holding. In many years, water temperatures in the lower elevations of the action area may approach or exceed the upper preferred limit for adult spring-run Chinook salmon holding. During these years, most salmon hold and spawn at mid- to high-elevation habitats.

Riparian conditions affect juveniles by providing overhead shaded cover, in channel large woody cover, and contributing to aquatic food production. Adult salmonids also benefit from the refugia created by overhead and in-channel cover, especially in areas that correspond with deep water.

Local hydrologic and geologic processes have created diverse aquatic habitat types that are used by both species. Habitat types that include deep pools, riffles, runs, vegetated back waters, and shallow margins are created and maintained by these processes, and contribute to extensive holding, spawning habitat, and rearing habitats. Land management activities that may affect anadromous fish and aquatic habitat within the action area primarily include forest and rangeland management, and watershed restoration. In 2002 LNF amended its Land and Resources

Management Plan with an Aquatic Management Strategy that includes a Long-term Anadromous Fish Strategy (USFS 2004b). The Long-term Anadromous Fish Strategy contains standards and guidelines for all LNF land management activities that must be implemented to maintain or improve watershed, riparian and aquatic habitat conditions that affect anadromous fish in Deer, Mill, and Antelope Creeks. The goal of the strategy is to maintain and improve anadromous fish habitat in the action area watersheds.

Recreational angling also may affect spring-run Chinook salmon and steelhead. The BA (USFS 2004a) explains that Deer, Mill, and Antelope Creeks have been used for recreational angling for many years. Prior to 1994, all three streams were planted by CDFG with catchable trout. In 1994, CDFG suspended planting trout into the anadromous waters of the action area and adopted special regulations to protect the declining numbers of anadromous fish. The current fishing regulations within the action area allow angling from the last Saturday in April until November 15. Angling is limited to barbless hooks and the bag limit is zero fish. According to LNF recreation surveys, implementation of these regulations resulted in a dramatic drop in use at campgrounds adjacent to the action area, with a likely reduction in overall angler use and pressure (USFS 2002). Although current regulations prohibit the harvest of anadromous fish within the action area, angling may contribute to the injury and mortality of some fish.

C. Likelihood of Species Survival and Recovery in the Action Area

The action area encompasses a substantial amount of the overall migration, holding, spawning and rearing habitat available to CV spring-run Chinook salmon and CV steelhead. The quantity, quality, and complexity of this habitat make it an important node of habitat in the Sacramento River for the survival and recovery of Sacramento River CV spring-run Chinook salmon and CV steelhead. Considering the quality of habitat conditions within the action area, recent trends in abundance, and Federal land management strategies that protect, maintain, and restore anadromous habitat within the Mill, Deer, and Antelope Creek watersheds, it appears that spring-run Chinook salmon and steelhead will continue to utilize the action area for migration, holding, spawning and rearing, and that this utilization will represent an important contribution to the recovery of the species.

V. EFFECTS OF THE ACTION

A. Approach to the Assessment

1. <u>Information Available for the Assessment</u>

Information available for describing the effects of the proposed project on spring-run Chinook salmon and steelhead includes timing of migration, holding, spawning, and rearing; distribution and abundance data; angler survey data; salmonid injury and mortality rates from other drainages; and watershed disturbance indicators summarized in LNF's Watershed Analysis for Mill, Deer, and Antelope Creeks (USFS 2000). Elements from the Matrix of Pathways and Indicators were used for evaluating potential direct and indirect effects of the proposed action. The Matrix of Pathways and Indicators was developed by NMFS and the U.S. Forest Service for evaluating the impacts of human activities on anadromous salmonid habitat.

2. Assumptions Underlying this Assessment

Several assumptions are applied to this assessment. This assessment assumes that current salmon and steelhead migration, holding, spawning, and rearing timing, distribution, and abundance trends will continue over the period of the proposed permits. It also assumes that angler survey information is an accurate representation of angler effort; that probability of capture estimates and rates are accurate and consistent; that angler use estimates provided by the permittees are accurate; and that salmonid injury and mortality rates from other streams are applicable to Deer, Mill, and Antelope Creeks. The assessment also assumes that hooking injury types and rates are reasonably similar between species and are applicable to adult and juvenile Chinook salmon and steelhead. Since it is not possible to capture a fraction of a fish, this assessment rounds up capture, injury, and mortality estimates to the nearest whole number.

B. Assessment

The proposed action involves an annual maximum of 152 angler visits for instructional and guided recreational angling that are likely to result in the capture, injury, and death of adult and juvenile spring-run Chinook salmon and steelhead. There also is a potential for the action to disturb salmon and steelhead redds and injure or kill incubating eggs or pre-emergent larvae.

1. Central Valley Spring-run Chinook salmon

There is no available information regarding capture, injury and mortality impacts to spring-run Chinook salmon associated with catch and release fishing on Antelope, Deer or Mill Creeks. In this assessment we use injury and mortality rates from salmon and trout studies conducted in other streams, encounter and mortality estimates provided by LNF, and we considered habitat use and fish behavior to determine the approximate risk, and significance of capture, injury, and mortality to adult, juvenile, egg, and pre-emergent life stages of spring-run Chinook salmon.

Adult and juvenile Chinook salmon may captured by anglers. Adult spring-run Chinook salmon hold in pools throughout the action area that will be visited by anglers throughout the period of use. Adult Chinook salmon do not feed during the summer, so the probability of capture while fly fishing is expected to be low. LNF estimates that between one and five adult spring-run Chinook salmon may be captured as a result of the proposed action.

To estimate the capture levels of juvenile spring-run Chinook salmon, LNF first expanded fish abundance data from habitat typing surveys, and made comparisons of adult Chinook salmon and steelhead abundance to estimate relative juvenile abundance. LNF then used catch rates developed by Butler and Borgsen (1966) on other streams to estimate catch rates specific to the action area. Butler and Borgsen (1966), in summarizing results from 13 studies on catchable trout fisheries, found catch rates to range from 0.63 to 1.56 fish per hour (fish/hr). Since juvenile spring-run Chinook salmon occupy edgewater and backwater habitats that tend to segregate them from trout, their catch rate was assumed to be lower (*i.e.,* 0.25 fish/hr for guided fishing, and 0.05 fish/hr for instruction fishing). The probability of catch and the catch rate were then multiplied by the total number of angler hours to estimate the total juvenile catch. The estimated juvenile catch for 152 angler hours is 3 fish in Deer Creek, 2 fish in Mill Creek, and 2 fish in Antelope Creek, for a total of 7 juvenile spring-run Chinook salmon throughout the action area.

In a fish injury study on Alaska's Alagnak River, Meka (2003) evaluated the effects of catch and release fishing on rainbow trout. This study found that the primary hooking location was the jaw (*i.e.*, 70 percent of captured fish), but the second most common location was the eye, or the jaw and the eye together (*i.e.*, 10 percent of fish captured). The overall hooking injury rate for fish captured with barbless hooks was 50 percent, compared to 67 percent for barbed hooks. Hooking injury was identified if the hook caused tissue damage to external areas that would lead to a permanent scar, or if the hooking occurred in a sensitive area (*i.e.*, tongue or gills). Our assessment applies the 50 percent injury rate found on the Alagnak River to adult and juvenile spring-run Chinook salmon that are captured as a result of the proposed action because studies specific to hooking related injury rates for Chinook salmon are not readily available, because rainbow trout and Chinook salmon have similar body forms, and because the fishing techniques that will be used by the permittee are similar to the techniques that were used in the Alagnak River study. By applying an injury rate of 50 percent, and assuming that one to five adult spring-run Chinook salmon may be captured, we expect that between one and three adult spring-run Chinook salmon may be injured. We expect that annual juvenile hooking injuries will be less than 1 fish per year in each stream (*i.e.*, 0.65 fish in Deer Creek, 0.6 fish in Mill Creek, and 0.6 fish in Antelope Creek.

To determine hooking mortality, we used mortality rates provided by LNF and by Bendock and Alexandersdottir (1993). LNF (USFS 2004) found that hooking mortality rates from trout and steelhead angling studies conducted on other streams ranged from 0.3 percent to 4.8 percent, and applied a rate of 5 percent to their analysis. We applied this rate to juvenile Chinook salmon because juvenile Chinook salmon are small and are likely to die at rates similar to trout. In Alaska, Bendock and Alexandersdottir (1993) used radio tracking to assess effects to adult Chinook salmon caught and released by anglers in the Kenai River, and found the average mortality rate over a 3-year period was 7.6 percent and ranged from 4.1 percent to 10.6 percent. For a conservative mortality estimate, NMFS applied the maximum mortality rate to adult Chinook salmon in the action area. Based on these mortality rates, adult and juvenile spring-run Chinook salmon hooking mortalities are expected to be less than 1 fish per year (*i.e.*, adult mortalities between 0.1 and 0.5 fish and juvenile hooking mortalities of 0.08 fish in Deer Creek, and 0.03 fish each in Mill and Antelope Creeks).

There is a potential for recreational anglers to capture, harass, injure, or kill spawning spring-run Chinook salmon, and injure or kill eggs and pre-emergent larvae by trampling on redds while wading. The conservation measure proposed by LNF to terminate permitted angling upon the first detection of spawning activity is expected to prevent anglers from catching spawning fish and damaging redds. Therefore, the proposed action is not expected to result in the harassment, injury, or death of these life stages.

2. Central Valley Steelhead

There is no available information regarding capture, injury and mortality impacts to steelhead associated with catch and release fishing on Antelope, Deer or Mill Creeks. Similar to the assessment for spring-run Chinook salmon, we use injury and mortality rates from salmon and trout studies conducted in other streams, encounter and mortality estimates provided by LNF, and we considered habitat use and fish behavior to determine the approximate risk, and significance of capture, injury, and mortality to adult, juvenile, egg, and pre-emergent life stages of steelhead.

The timing of the use period should limit, but not eliminate potential impacts to adult steelhead. Steelhead spawning extends from January through April. Though not well documented in the subject streams, literature on steelhead elsewhere in the Central Valley indicates that most adults leave streams shortly after spawning (McEwan and Jackson 1996, Moyle 2002). This is supported by LNF snorkel surveys of Deer, Mill, and Antelope Creeks conducted during the state regulated fishing season. These surveys have made only infrequent observations of potential adult steelhead. However, angler surveys and discussions with anglers provide some evidence that large trout (greater than16 inches) are occasionally caught in the three creeks. Given the difficulty in distinguishing between resident trout and anadromous steelhead, trout greater than 16 inches typically are assumed to be anadromous adults (CDFG 2001). Based on this information, LNF estimates that from one to five adult steelhead will be caught, and released during the period of use.

LNF expanded fish abundance data from habitat typing surveys, and made comparisons of adult steelhead abundance to estimate that juvenile steelhead make up to approximately 5 percent, and resident trout make up to 75 percent of the total juvenile salmonid assemblage in each stream. However, research has found little or no difference between anadromous and non-anadromous forms inhabiting the same stream system (McEwan 2001), and there is evidence that anadromous and non-anadromous forms can form a single interbreeding population within anadromous reaches of a stream system. For this reason, NMFS believes that it is not possible to distinguish between the two life-history forms (*i.e.*, anadromous and resident fish) within the action area. Therefore, for the purpose of estimating the probability of catch, our assessment combines anadromous steelhead and resident trout assemblages into one group. Instead of using LNF's probability of catch estimate of 5 percent for juvenile steelhead, NMFS used 80 percent, which represents LNF's estimated combined *O. mykiss* composition (*i.e.*, resident and anadromous estimates combined). Similar to the assessment for juvenile spring-run Chinook salmon, data from angling surveys and studies of angling success were used to determine a catch rate per angler hour. We used LNF's estimated catch rate of one fish/hr of angling effort for steelhead for the "guide" component of the permitted use. We also used LNF's estimated catch rate of 0.25 fish/hr for the "instructional" component of the proposed action, which assumes that catch rates will be lower than the "guided" component of the action. The catch rate and the probability of capture were then multiplied by the total number of angler hours to estimate the total juvenile catch. The estimated juvenile catch for 152 angler hours is 50 fish in Deer Creek, 22 fish in Mill Creek, and 22 fish in Antelope Creek.

This assessment applies the 50 percent injury rate found on the Alagnak River (Meka 2003) to adult steelhead that are captured as a result of the proposed action. This rate is applied to assessment because studies specific to hooking related injury rates for adult steelhead are not available, because rainbow trout and adult steelhead have similar body forms, and because the fishing techniques that will be used by the permittee are similar to the techniques that were used in the Alagnak River study. Applying an injury rate of 50 percent, and assuming that one to five fish may be captured over the period of the proposed action, up three adult steelhead may be injured as a result of the action. Estimated annual juvenile steelhead hooking injuries are 25 fish in Deer Creek, 11 fish in Mill Creek, 11 fish in Antelope Creek.

LNF (USFS 2004) found that hooking mortality rates from trout and steelhead angling studies conducted on other streams ranged from 0.3 percent to 4.8 percent, and applied a rate of 5 percent to their analysis. Applying a mortality rate of 5 percent, and assuming that one to five adult fish may be captured over the period of the proposed action, less than one fish is expected to die as a result of the proposed action. Estimated annual juvenile hooking mortalities are three fish in Deer Creek, and two fish in each of Mill and Antelope Creeks.

There is a potential for recreational anglers to capture, harass, injure, or kill spawning steelhead, and injure or kill eggs and pre-emergent larvae by trampling on redds while wading. However, CDFG fishing regulations prohibit fishing in the action area during the spawning season. Therefore, the proposed action is not expected to result in the harassment, injury, or death of these life stages.

3. Habitat

Changes to habitat elements such as water quality, fish passage, stream flow, water temperature, and watershed condition will not occur because there will not be any ground or aquatic habitat disturbance associated with the proposed action. Therefore, adverse effects to fish habitat, including proposed critical habitat for CV spring-run Chinook salmon and CV steelhead are not expected.

4. Interrelated or Interdependent Actions

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). There are no interrelated or interdependent actions associated with the proposed action.

VI. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hatcheries, water diversions, and some land management activities, will be reviewed through separate section 7 consultation processes and not considered here. Similarly, non-Federal actions that require authorization under section 10 will be evaluated in separate section 7 consultations and not considered here.

Activities that are occurring or that may occur on non-federally managed lands within the action area include, but are not limited to recreation, recreational angling, timber harvest and associated road development, and livestock grazing. These activities likely will continue to affect population abundance, water quality, and habitat conditions in the action area, and thus result in cumulative effects to listed Chinook salmon and steelhead. With existing watershed conservancies on Deer and Mill Creeks, the potential for cumulative impacts to adversely affect listed salmonids is likely to be less than it would be without the existence of these conservancies because they encourage private property owners to maintain responsible stewardship of the land and its biological resources.

VII. INTEGRATION AND SYNTHESIS

NMFS finds that the effects of the proposed action on CV spring-run Chinook salmon, and CV steelhead will include the capture, injury and death of adult and juvenile spring-run Chinook salmon and steelhead as a result of permitting an annual maximum of 152 angler visits to Deer, Mill, and Antelope Creeks for 2 years. It is estimated that up to five adult CV spring-run Chinook salmon and up to five adult CV steelhead will be captured, and less than one adult of each species will be killed.

The proposed action will also result in the capture, injury, and death of juvenile CV spring-run

Chinook salmon and CV steelhead. The total estimated catch of juvenile spring-run Chinook salmon is seven fish, resulting in injury to approximately two fish, and the mortality of less than one fish. The total estimated catch of juvenile steelhead is 94 fish, resulting in injury to 47 fish, and the mortality of 5 fish.

Given the uncertainties related to the population size of steelhead and juvenile salmonids within the action area, as well as the assumptions applied throughout the effects assessment, these estimates may not accurately quantify the amount of take. Rather, the estimates should be considered an index which represents the extent of take associated with permitting 152 angler visits. The utility of the capture, injury, and mortality estimates is that they provide reasonable approximations of the number of fish that may be affected by the action. The level of spring-run Chinook salmon and steelhead capture and mortality, relative to the overall abundance within the action area, and within ESUs is likely to be small. The annual loss of less than one adult spring-run Chinook salmon and one steelhead, for 2 years, represents a small fraction of the overall adult abundance of each species (*i.e.*, less than 0.1 percent) and is not expected affect the continued survival of the species. Similarly, the loss of less than one juvenile spring-run Chinook salmon and five juvenile steelhead represents an even smaller fraction of the overall juvenile abundance, and is not expected to affect the abundance of returning adults, or continued survival of the species.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of CV spring-run Chinook salmon, and CV steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that issuance of two special use permits that authorize outfitter guide fishing on LNF streams, as proposed, is not likely to jeopardize the continued existence of CV spring-run Chinook salmon or CV steelhead. Additionally, the proposed action will have no effect on anadromous fish habitat. Therefore, the issuance of two special use permits that authorize outfitter guide fishing on LNF streams, is not likely to destroy or adversely modify the proposed critical habitat Central Valley spring-run Chinook salmon and Central Valley steelhead.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by LNF and the permittee so that they become binding conditions of any grant or permit, as appropriate, for the exemption in section 7(o)(2) to apply. LNF has a continuing duty to regulate the activity covered by this incidental take statement. If LNF: (1) fails to assume and implement the terms and conditions, or (2) fails to require the permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, LNF must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14[i][3]).

A. Amount or Extent of Take

NMFS anticipates that the proposed action will result in incidental take of CV spring-run Chinook salmon, and CV steelhead. Incidental take associated with this action is expected to be in the form of capture, injury, and death of adult and juvenile spring-run Chinook salmon and steelhead caused by instructional and guided fly fish activities.

NMFS estimates that the proposed action will result in the annual capture of up to 5 adult CV spring-run Chinook salmon; up to 5 adult CV steelhead; up to 5 juvenile spring-run Chinook salmon; and up to 94 juvenile steelhead. NMFS estimates that the proposed action will result in the annual injury of up to 3 adult CV spring-run Chinook salmon; up to 3 adult CV steelhead; up to 3 juvenile spring-run Chinook salmon; and up to 47 juvenile steelhead. The proposed action also will result in the annual death of up to one adult CV spring-run Chinook salmon; one CV steelhead; one juvenile spring-run Chinook salmon; and up to five juvenile steelhead.

Because of the low mortality rates that are expected, the number of assumptions and uncertainties that went into the development of capture, injury, and mortality estimates, and the likelihood that most mortality will be latent and not observed by the permittee or individual anglers, NMFS believes that it is necessary to limit the action to the maximum number of permitted angler visits rather than the capture, injury, and mortalities estimated in the assessment. Specifically, take during the period of the proposed action is not expected to exceed that associated with permitting 152 days of angler visits to the action area per year for up to 2 years. Additionally, if monitoring indicates that annual capture, injury, or mortality rates for listed salmonids are higher than estimated, then incidental take also may be exceeded.

B. Effect of the Take

In the accompanying biological opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species considered in this opinion.

C. Reasonable and Prudent Measure

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measure (RPM) is necessary and appropriate to minimize take of listed spring-run Chinook salmon and steelhead.

1. Measures shall be taken to minimize and monitor injury and mortality of captured salmonids.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, LNF and the permittee must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. **Measures shall be taken to minimize and monitor injury and mortality of captured salmonids.**

    a. All captured specimens shall be released without additional harm or injury immediately after capture.

    b. The permittee shall not remove any captured specimens from the water.

    c. The permittee shall not conduct any form of gastric lavage (*i.e.*, removal of stomach contents) on captured specimens.

    d. LNF shall develop an angler awareness guide and provide it to the permittee for distribution to permitted anglers. The angler awareness guide should explain the listing status of CV spring-run Chinook salmon and CV steelhead pursuant to the ESA, and should explain the significance of the Deer, Mill, and Antelope Creek populations for sustaining and recovering the species.

    e. LNF shall produce a map for distribution to the permittees that delineates permitted and restricted fishing areas as described in the proposed action.

f. An angler tracking form shall be filled out for each angler visit and include fishing location; hours fished; number of anglers; fish caught, estimated species and estimated length; and any observation of hooking injury and mortality.

g. If an adult Chinook salmon is incidentally hooked, the angler must immediately break the fish off by pointing their rod towards the hooked fish and applying sufficient pressure on the reel spool to either pull the hook out of the fish or break the line.

h. LNF shall submit copies of angler tracking forms to NMFS within 60 days of the annual angling season. Reports and notifications required by these terms and conditions shall be submitted to:

Sacramento Area Office Supervisor
National Marine Fisheries Service
650 Capitol Mall, Suite 8-300
Sacramento California 95814-4706
FAX: (916) 930-3629
Phone: (916) 930-3600

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. These conservation recommendations include discretionary measures that LNF can implement to avoid or minimize adverse effects of the proposed action on a listed species. NMFS provides the following conservation recommendations that would avoid or reduce adverse impacts to listed salmonids:

1. LNF should continue to conduct angler monitoring at developed recreation sites and other locations.

2. LNF should continue to coordinate with CDFG game wardens and other local law enforcement personnel to prevent and curtail illegal fishing activities along Deer, Mill, and Antelope Creeks.

3. LNF should continue to post State of California fishing regulations, and special angling restriction notices along accessible areas of Deer, Mill, and Antelope Creeks.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

XI. REINITIATION OF CONSULTATION

This concludes formal consultation on the issuance of two special use permits that authorize outfitter guide fishing on LNF streams. Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in any incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or proposed critical habitat in a manner or to an extent not previously considered, (3) the action, including the avoidance, minimization and compensation measures listed in the *Description of the Proposed Action* section is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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